REMARKS

Claims 15 – 18, 21, 27 and 29 – 35 remain in the application. Originally filed claims 1-14 were cancelled by Preliminary Amendment which also added claims 15-34. Claims 19, 20, 22-26 and 28 have been cancelled by this Amendment. Claims 15-18, 27, and 29-33 have been amended herein. Claim 35 has been added by this Amendment.

THE EXAMINER'S OBJECTIONS / REJECTIONS

Oath/Declaration

The Examiner states that the oath or declaration is defective.

A new Declaration is enclosed herewith and is believed to be in compliance with 37 C.F.R. § 1.67 (a).

Specification

The Examiner States:

> This application does not contain an abstract of the disclosure as required by 37 CFR § 72(b). An abstract on a separate sheet is required.

An Abstract, believed to be in compliance with 37 C.F.R. § 72(b), is attached hereto.

The Examiner States:

> The disclosure is objected to because of the following informalities: The specification lacks a reference to the prior application. Appropriate correction is required.

The instant application is a National Stage Filing of PCT International Application Number PCT/EP00/08653 and no further reference is believed to be required.

Allowable Subject Matter

The Examiner states that Claim 34 is allowed.

Double Patenting

The Examin r Stat s:

> Claims 1-33 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-18 of U.S. Patent No. 6,387,247. Although the conflicting claims are not identical, they are not patentably

distinct from each other because each set of claims is drawn to a nozzle and FCC unit containing the nozzle. The patented claims include the additional limitation that the slot in the second cap is radially offset from the axis of the nozzle. However, the claims of the present application do not exclude additional features and do not limit the location of the slot. Therefore, the patented claims are a specific case of the generic claims of the present application.

This rejection is respectfully traversed. The following arguments and comments address the distinguishing characteristics over US Patent No. 6,387,247.

- **"Continuous" circular slot vs. discontinuous slots of 6,387,247– NOTE: For the Examiner's convenience, the following statements within quotation marks are taken from the instant specification,.**

The continuous circular slot of the instant invention is clearly shown in Figure 5A:

> "Figure 5A shows a plan view of the second cap 48 located at the end of hydrocarbon conduit 38 as in Figure 2B. It has been found advantageous that the annular outlet passage 11 is **open along its entire circumferential** (emphasis added) as illustrated in Figure 5A." (Page 12, Lines 1 - 5).

This is different from the invention of 6,387,247, which has discontinuous sections of outlet passages 11 as shown in Figure 2B:

> "Figure 2B shows a plan view of the second cap 48 located at the end of hydrocarbon conduit 38. Cap 48 is shown to have a circular slot consisting of four elongated, curved outlet passages 11 on conical surface 45 as an example for emitting a conical formed spray consisting of four individual fan sprays ...", (Page 11, Lines 12 - 17).

The advantages of the instant invention with a continuous slot over the invention of 6,387,247 is clearly demonstrated by comparing the outlet passages on Figure 5A vs. Figure 2B:

> "Figure 5A shows a plan view of the second cap 48 located at the end of hydrocarbon conduit 38 as in Figure 2B. It has been found advantageous that the annular outlet passage 11 is open along its entire circumferential as illustrated in Figure 5A. In Figure 2B the circular slot is divided by four bridges resulting in four separate passageways 11. By reducing or omitting the bridges, of Figure 2B, one single circular slot opening and one single conical formed spray results. This is advantageous to achieve a more uniform and unobstructed flow of the mixture of first dispersing gas 12 and hydrocarbon feed 8 into riser 1." (Page 12, Lines 1 - 12).

The advantages of the instant invention with a continuous slot over the invention of 4,795,547 is clearly demonstrated in the comparison of Tables 1 and 2,

> "A single bottom entry nozzle according to the present invention of Figure 1 was installed in one of Assignee's FCC units which originally had a single bottom entry nozzle according to the prior art, shown in Figure 2 of US-A-4795547 patent, reproduced as Figure 3 herein.
> Operating conditions of the FCCU, before and after the revamp, are listed in Table 1:

TABLE 1

		Average Post Revamp	Average Pre Revamp	Delta
PROCESS CONDITIONS				
Feed Rate	ton/day	5281.3	5185.8	95.5
Feed Temperature	ton/day	268.7	260.3	8.4
First dispersion Steam	ton/day	80.0	36.9	44.1
Second dispersion Steam	ton/day	11.5	11.5	0
Additional dispersing Steam	ton/day	24.2	18.6	5.6
Reactor Temperature	°C	494.2	493.2	1.1
Regen Temperature	°C	700.9	697.2	3.8
Liftpot Pressure	Barg	2.0	2.2	-0.2
Reactor Pressure	Barg	1.8	1.9	-0.2
Regen Pressure	Barg	2.0	2.2	-0.2
Cat Circulation Rate	ton/min	17.7	17.9	-0.2

The performance of the FCCU, before and after the revamp, are listed in Table 2:

TABLE 2

	Average Pre Revamp	Average Post Revamp Delta Wt.% of Feed
C2-	base case	-0.2
LPG	base case	-1.1
Gasoline	base case	1.1
Light cycle oil	base case	1.2
Heavy cycle oil & slurry	base case	-1.3
Coke	base case	0.0

The data show that the present invention improves the FCCU performance by reducing the low value products of C2- dry gas, LPG and the combination of heavy cycle oil and slurry by 0.2, 1.1 and 1.3 weight %, respectively, and

> increasing high value products of gasoline and light cycle oil by 1.1 and 1.2 weight %, respectively. In addition to the benefit of producing more valuable products, the FCCU also processed 1.9% more feed, as shown in the previous table of operating conditions" (Page 17, Line 18 through Page 19, Line 5).

"A single bottom entry nozzle according to the present invention of Figure 1 ..." (Page 17, Lines 18-19) quoted in the comparison of Tables 1 and 2, is the preferred embodiment of the instant invention of Figures 6 and 7 with a continuous single circular slot. "FIGURES 6 and 7 show detail design features of another preferred feed injection system of Figure 1" (Page 6, Lines 3 - 4).

- **First cap includes at least one attachment to second cap vs. no such attachment in US Patent No. 6,387,247**

In order to form a continuous slot **11** in the instant invention, the **center part of first cap 32 is completely cut off** from the first cap and must have some means to attach to the remaining part of nozzle **100**. Figure 6 shows a center pin **59** connecting the first cap **32** to second cap **48**:

> "The second cap 48 can be fixed onto the nozzle 100 by means of one or more fixing means 59, for example by means of a bolt or welded pin, connecting the second cap with the first cap 32." (Page 13, Lines 29 - 33).

The center pin is also shown in Figure 7 of the instant application:

> "Figure 7 shows a first cap 32 of Figure 6 as seen from above, provided with five outlet openings 57 and two concentric lines of passageways 14 and fixing means 59." (Page 13, Lines 33 - 35).

On the other hand, in 6,387,247, the slots are discontinuous and the center part of first cap 32 is still connected to the remaining of nozzle 11 through "bridges" in between the sections of slots as shown in Figure 2B:

> "In Figure 2B the circular slot is divided by four bridges resulting in four separate passageways 11" (Page 12, Lines 5 - 7).

Consequently, Figure 2A of US Patent No. 6,387,247 does not show a center pin 59 or other connection as in the instant invention.

IN SUMMARY, Applicants' invention distinguishes over the prior art by incorporating:

- at least one continuous circular slot as an outlet passageway in the second cap, and
- a first cap which includes at least one attachment to the second cap inside the circular slot.

The circular slot in the second cap will ensure that the hydrocarbon droplets are uniformly distributed across the riser, plus the other advantages as mentioned on page 5, lines 7-22. It has been found that, when the two-phase mixture of small dispersed bubbles, for example steam bubbles, in liquid heavy petroleum hydrocarbon passes through this circular slot passageway into the riser, a hollow cone of fine droplets of hydrocarbon forms due to the sudden expansion of said mixture when contacted with the high temperature regenerated catalysts (see page 7, lines 25-32).

Thus a bottom entry feed nozzle is provided which can distribute the feed across the riser and which feed nozzle is resistant to erosion damage.

Applicants respectfully request reconsideration of all claims (15 – 18, 21, 27 and 29 – 35) now pending in the application and submit that, in view of the amendment of Claims 15 – 18, 21, 27 and 29 - 33 and arguments above, the Examiner's rejection of these claims have been overcome. The Examiner is respectfully requested to withdraw the rejection. Since Claim 34 is allowed, it is respectfully requested that the case be passed to Issue.

It is believed that no additional fees are required by this amendment other than for the accompanying Request For Extension of Time. If this is in error, please charge any such fees to Deposit Account No. 19-1800.

If the Examiner feels that a telephone conversation would assist in bringing this case to a conclusion, he is requested to contact the undersigned at 713-782-3620.

Respectfully submitted,

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Enclosure: Inventors' Declaration